

**Cruysberghs**  
bvba  
Chemical

Producer of construction  
specialty chemicals **REAXYL**<sup>®</sup>

Approved BASF Construction  
Chemicals partner



Dealer of PCI tile adhesive systems and  
construction chemical additives



# Economic BEN living in renovation and new buildings

without cavity wall  
without cavity wall ties  
without water repellent  
without extra foundations  
without thermal bridges  
without moisture problems

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### What is a BEN house?

BEN stands for "bijna energieneutrale woning" or almost energy neutral house.

You can renovate almost any existing house yourself in a very simple and economical way.

Every new construction can be built in a very simple, almost or completely energy neutral way, in accordance with the standard for new buildings from 2021 in Europe.

After thorough investigation in more than 35.000 buildings in Belgium, the Netherlands, Luxemburg, Germany and France, it seems there are still a lot of mistakes being made with the placement of cavity wall membrane. This leads to a lot of moisture problems. According to the WTCB, 69% of the reported damages to buildings have a direct or indirect connection to moisture.

The determined correct causes of the posted moisture problems in 35.000 of the inspected building in Belgium, the Netherlands, Germany, Luxemburg and France are:

- 63%** faulty cavity wall membrane at the height of the ground level zone
- 21%** cavity wall condensation
- 19%** driving rain throughout the outer facade
- 18%** leaking drains
- 15%** excessive vapour pressure coming from the crawl space, wet basement or a well
- 3%** leaking water supply line
- 2%** directly leaking into the cellar (real groundwater)
- 1%** leakage in concrete cellars
- 1%** leakage in the roof
- 0%** rising damp (this is never the cause, only the resulting damage)
- 0%** moisture because of faulty insulation or thermal bridges (= not a cause, only resulting damage)

multiple causes are probable.

With the ECOBEN system (A,B,C or D) are all these problems a definite thing of the past.



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## Payback time

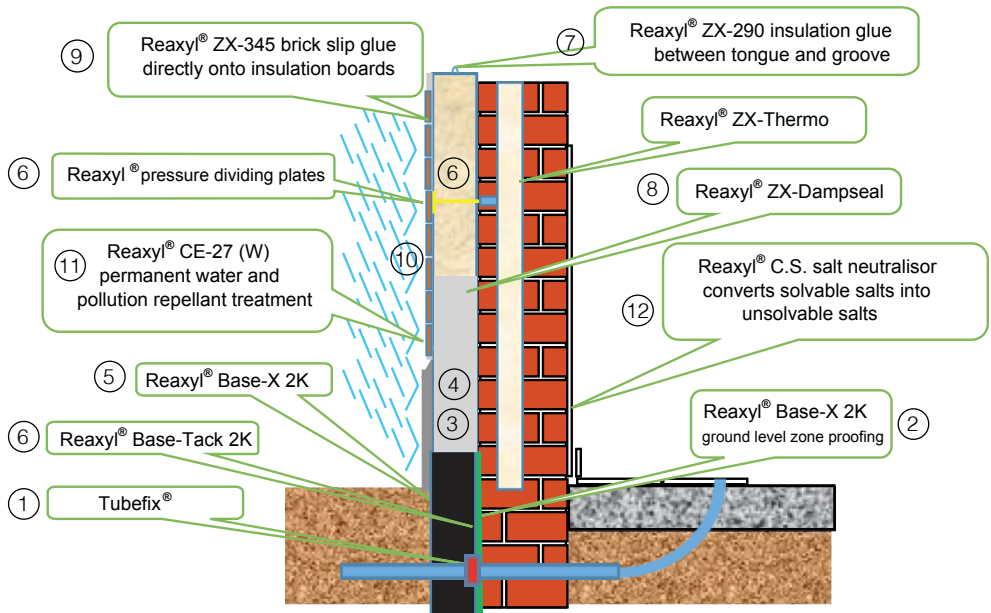
A solid wall (lambda value 2,97 W/m<sup>2</sup>K), without open cavity wall, has a calculated energy loss through the outer walls of € 2.464,- per 100 m<sup>2</sup> per year. With an open cavity wall (lambda value 1,59 W/m<sup>2</sup>K), this is € 1.319,- per 100 m<sup>2</sup> per year. When you have an open cavity wall of 6 cm and you insulate this cavity wall with PUR, with lambda value of  $\mu$  0,023 W/m<sup>2</sup>K, then the energy loss decreases throughout the outer walls to € 324,- per 100 m<sup>2</sup> per year. When you place enforced insulation at the outer wall according to the ECOBEN system, then the total energy loss throughout the outer wall decreases to less than € 150,- per 100 m<sup>2</sup> per year. With outer insulation of 10 cm PUR, equipped with a double vapor barrier, you save between € 1.100,- and € 2.300,- per 100 m<sup>2</sup> per year. In 10 years' time this is an energy saving between € 11.000 and € 23.000,-. The total cost of the needed products is  $\pm$  € 3.200 per 100 m<sup>2</sup> wall surface. Including insulation and brick strips, this is around € 10.000, not placed. When you place the complete system yourself, you have returned your investment in 4 à 10 years.



## BEN living system A

### How to proceed:

1. Remove the ground level zone around the house up to – 50 cm and seal all ducts and ventilations throughout the foundation or cellar wall with Tubefix®.
2. Make the ground level zone waterproof until the (new) ground level with Reaxyl® Base-X 2K. With this you can prevent possible moisture problems because of a saturated ground level zone (read more at [www.humida.be](http://www.humida.be)).
3. Take insulation boards which are pressure proof and vapour tight (e.g. type Recticel Powerwall). To understand the need to build vapour tight and to insulate, you can best buy the manual "Vochtbeheersing tegen 2021". You can order this book at [www.humida.be](http://www.humida.be).
4. The thickness of the insulation boards are to be chosen depending on the local legal determinations. Always take a minimal thickness of 12 cm PUR ( $\lambda$  0,023). You can go 14 cm out of the building line (see building line decree). According to the VEA, a maximum deviation of 26 cm would be more appropriate.
5. Place the insulation boards up to –50cm under the to be finished ground level zone. The shortest way from the thermal bridge to the existing inner floor has to be minimum 1 metre. Treat the underground part of the insulation previously with Reaxyl® Base-X 2K or use XPS or Foamglass insulation boards.



6. Secure the insulation boards with long Reaxyl® ZX-screws, sturdy Reaxyl® ZX-plugs and Reaxyl® pressure dividing plates, about 9 pieces / m<sup>2</sup>. Secure the insulation boards with Reaxyl® pressure dividing plates for an optimal attachment of the vapour proof insulation boards to the outer facade, without danger for tearing of the vapour barrier. The Reaxyl® ZX pressure dividing plates are galvanised with sustainable Aluzinc. Glue the underground insulation boards against the foundation or cellar walls with Reaxyl® Base-X 2K (plastic insulation plugs are totally unsuitable).
7. Glue the seams of the insulation boards between tongue and groove with Reaxyl® ZX-290 insulation glue. This is how you make the complete insulation layer driving rain and air tight, even during a heavy storm. If you insulate in two layers or place the insulation thicker than 15 cm, you can best draw some horizontal lines of Reaxyl® ZX-290 insulation glue on the backside of every insulation board. This way you prevent possible subsidence in the future.
8. Finish connections, drillings and open sides vapour tight with Reaxyl® ZX-Dampseal (an aluminium tape is not suitable because it has a thermoplastic glue and it will unattach with warm weather).
9. Finish the insulation boards with brick strips, tiles or natural stones of choice. Attach the brick strips, tiles or natural stones with Reaxyl® ZX-345 brick strip glue.
10. When you have chosen the brick strips with joint, you can best seal these with a readymade jointing mortar in a colour of your choice. Add 2% Reaxyl® ZX-Flex to this to make the mortar more elastic and to improve the attachment. This is necessary to accommodate the thermal settings of the insulation boards.
11. Treat all facades with or without joints completely with Reaxyl® CE-27 W, 4 weeks after finishing and jointing. This keeps the walls frost free, water and pollution repellent. In a wooded area the walls will get less quickly green and the natural beauty will be kept after treatment. The water repellent treatment prevents that the multiple layered finish of the insulation boards are permanently burdened with moisture and there can occur internal damage or degeneration. Reaxyl® CE-27 W has a proven efficiency of more than 97% after 10 years.
12. Old residue of moisture spots or places where there is a historic salt load can be treated 3 x wet in wet with Reaxyl® C.S. Neutraliser. With this treatment all solvable salts are chemically converted into insoluble salts, whereby these cannot hold moisture anymore.



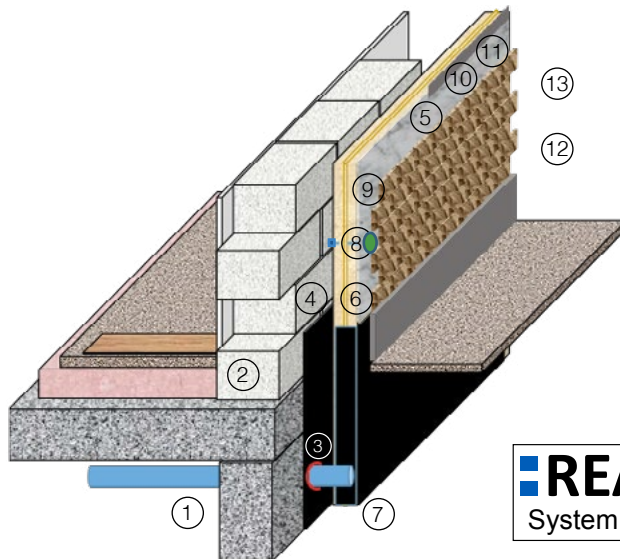
Approved total system by the WTCB according to pending test programs and technical information.

## BEN living system B

When constructing a new building there are a number of possibilities to build in an easy and economical way and still construct a building which is, without too much effort, almost energy neutral, like will be mandatory in Europe shortly. A new foundation for a new external wall and cavity wall membrane will be excessive.

### How to proceed:

1. Provide a concrete frost edge under the concrete slab up to – 80cm depth.
2. Glue (aerated concrete) or mason the internal cavity wall equal with the outside of the concrete slab. If you do not use aerated concrete, then you have to start with an insulation block to prevent a thermal bridge.
3. Seal all ducts and ventilations throughout the foundation or the cellar wall with Tubefix®.
4. Waterproof the ground level zone up to the (new) inner floor level with Reaxyl® Base-X 2K. With this you can prevent possible moisture problems because of a saturated ground level zone (read more at [www.humida.be](http://www.humida.be)).



5. Take insulation boards which are pressure proof and vapour tight (e.g. type Recticel Powerwall). To understand the need to build vapour tight and to insulate, you can best buy the manual "Vochtbeheersing tegen 2021". You can order this book at [www.humida.be](http://www.humida.be).

6. The thickness of the insulation boards are to be chosen depending on the local legal determinations. Always take a minimal thickness of 12 cm PUR ( $\lambda$  0,023) or PIR ( $\lambda$  0,021). You can go 14 cm out of the building line (see building line decree). According to the VEA, a maximum deviation of 26 cm would be more appropriate.

7. Install the insulation boards up to – 80cm under the to be finished ground level zone. The frost edge in Belgium remains at – 80cm under the new ground level zone. Treat the underground part of the insulation boards with Reaxyl® Base-X 2K or use XPS or Foamglass insulation boards.

8. Secure the insulation boards with long Reaxyl® ZX-screws, sturdy Reaxyl® ZX-plugs and Reaxyl pressure dividing plates, about 9 pieces / m<sup>2</sup>. Secure the insulation boards with Reaxyl® pressure dividing plates for an optimal attachment of the vapour proof insulation boards to the outer facade, without danger for tearing of the vapour barrier. The Reaxyl® ZX pressure dividing plates are galvanised with sustainable Aluzinc. Glue the underground insulation boards against the foundation or cellar walls with Reaxyl® Base-X 2K (plastic insulation plugs are totally unsuited).

9. Glue the seams of the insulation boards between tongue and groove with Reaxyl® ZX-290 insulation glue. This is how you make the complete insulation layer driving rain and air tight, even during a heavy storm. If you insulate in two layers or place the insulation thicker than 15 cm, you can best draw some horizontal lines of Reaxyl® ZX-290 insulation glue on the backside of every insulation board. This way you prevent possible subsidence in the future.

10. Finish connections, drillings and open sides vapour tight with Reaxyl® ZX-Dampseal (an aluminium tape is not suitable because it has a thermoplastic glue and will unattach with warm weather).

11. Finish the insulation boards with brick strips, tiles or natural stones of choice. Attach the brick strips, tiles or natural stones with Reaxyl® ZX-345 brick strip glue.

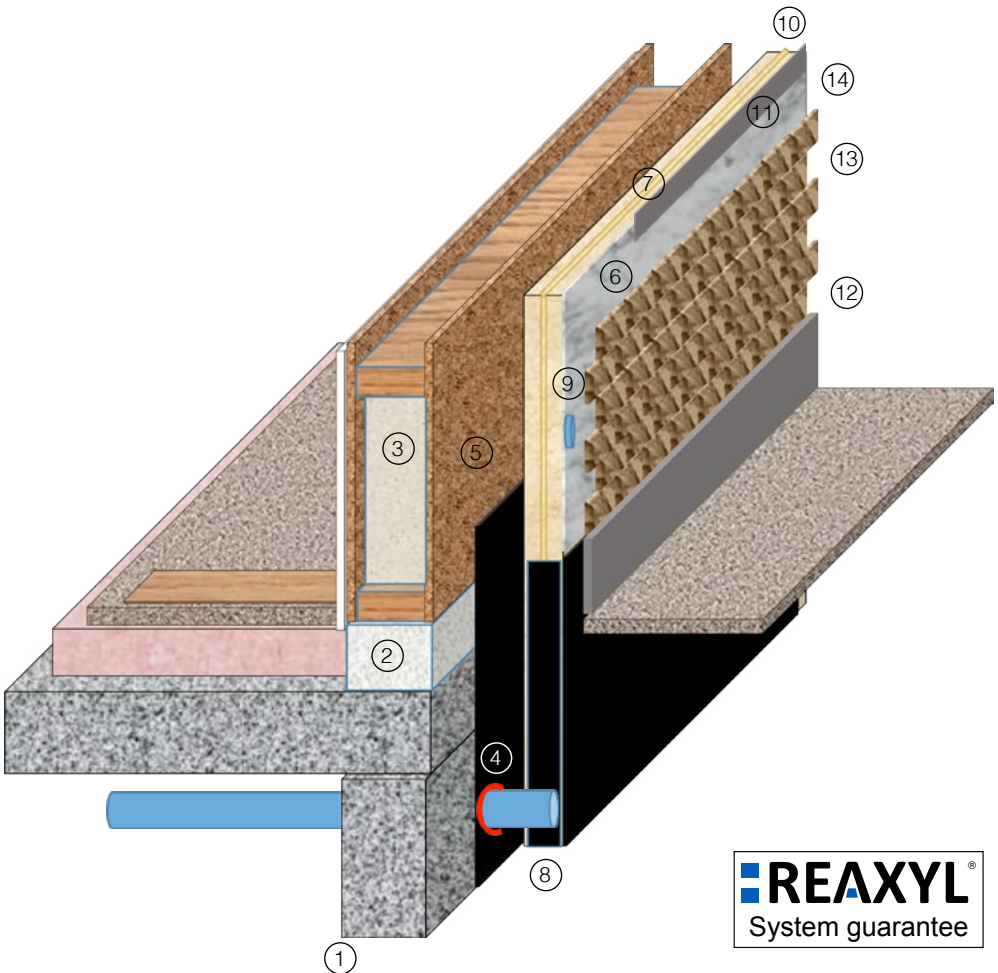
12. When you have chosen the bricks strips with joint, you can best seal these with a readymade jointing mortar in a colour of your choice. Add 2% Reaxyl® ZX-Flex to this to make the mortar more elastic and to improve the attachment. This is necessary to absorb the thermal setting of the insulation boards.

13. Treat all facades with or without joints completely with Reaxyl® CE-27 W, 4 weeks after the finishing and jointing. This keeps the walls frost free, water and pollution repellent. In a wooded area the walls will get less quickly get green and the natural beauty will be kept after treatment. The water repellent treatment prevents that the multiple layered finish of the insulation boards are permanently burdened with moisture and there can occur internal damage or degeneration. Reaxyl® CE-27 W has a proven efficiency of more than 97% after 10 years.



### BEN living system C

When constructing a new building there are a number of possibilities to build in an easy and economical way and still construct a building which is, without too much effort, almost energy neutral, like will be mandatory in Europe shortly. A new foundation for a new external wall and cavity wall membrane will be excessive.





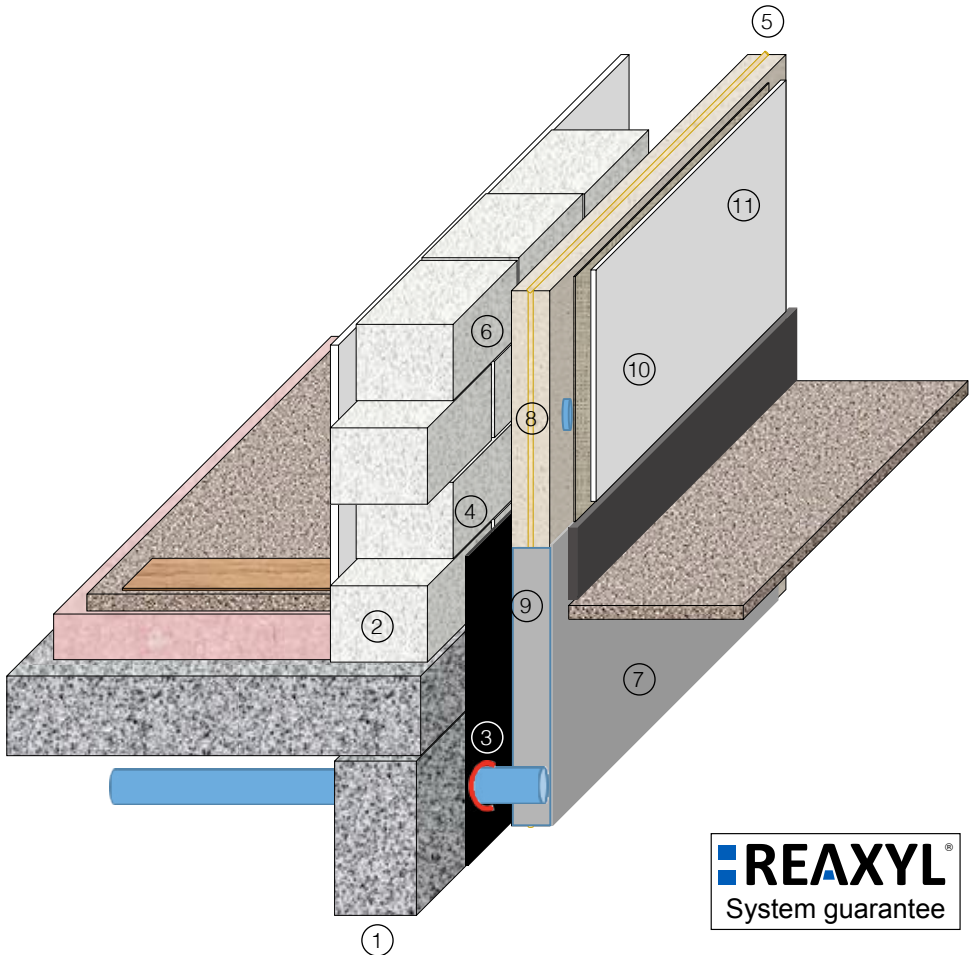
## How to work:

1. Provide a concrete frost edge under the concrete slab up to – 80cm depth.
2. Glue (aerated concrete) or mason the internal cavity wall equal with the outside of the concrete slab. If you do not use aerated concrete, then you have to start with an insulation block to prevent a thermal bridge.
3. Construct your traditional wood construction on the insulation block.
4. Seal all ducts and ventilations throughout the foundation or the cellar wall with Tubefix® .
5. Waterproof the ground level zone up to the (new) floor level with Reaxyl® Base-X 2K. With this you can prevent possible moisture problems because of a saturated ground level zone (read more at [www.humida.be](http://www.humida.be)).
6. Take insulation boards which are pressure proof and vapour tight (e.g. type Recticel Powerwall). To understand the need to build vapour tight and to insulate, you can best buy the manual "Vochtbeheersing tegen 2021". You can order this book at [www.humida.be](http://www.humida.be).
7. The thickness of the insulation boards are to be chosen depending on the local legal determinations. Always take a minimal thickness of 12 cm PUR ( $\lambda$  0,023) or PIR ( $\lambda$  0,021). You can go 14 cm out of the building line (see building line decree). According to the VEA, a maximum deviation of 26 cm would be more appropriate.
8. Install the insulation boards up to – 80cm under the to be finished ground level zone. The frost edge in Belgium remains at – 80cm under the new ground level zone. Treat the underground part of the insulation boards with Reaxyl® Base-X 2K or use XPS or Foamglass insulation.
9. Secure the insulation boards with long Reaxyl® ZX-screws, sturdy Reaxyl® ZX-plugs and Reaxyl pressure dividing plates, about 9 pieces / m<sup>2</sup>. Secure the insulation boards with Reaxyl pressure dividing plates for an optimal attachment of the vapour proof insulation boards to the outer facade, without danger for tearing of the vapour barrier. The Reaxyl® ZX pressure dividing plates are galvanised with sustainable Aluzinc. Glue the underground insulation boards against the foundation or cellar walls with Reaxyl® Base-X 2K (plastic insulation plugs are totally unsuited).
10. Glue the seams of the insulation boards between tongue and groove with Reaxyl® ZX-290 insulation glue. This is how you make the complete insulation layer driving rain and air tight, even during a heavy storm. If you insulate in two layers or place the insulation thicker than 15 cm, you can best draw some horizontal lines of Reaxyl® ZX-290 insulation glue on the backside of every insulation board. This way you prevent possible subsidence in the future.
11. Finish connections, drillings and open sides vapour tight with Reaxyl® ZX-Dampseal (an aluminum tape is not suitable because it has a thermoplastic glue and will unattach with warm weather).
12. Finish the insulation boards with brick strips, tiles or natural stones of choice. Attach the brick strips, tiles or natural stones with Reaxyl® ZX-345 brick slip glue.
13. When you have chosen the bricks strips with joint, you can best seal these with a readymade jointing mortar in a colour of your choice. Add 2% Reaxyl® ZX-Flex to this to make the mortar more elastic and to improve the attachment. This is necessary to absorb the thermal setting of the insulation boards.
14. Treat all facades with or without joints completely with Reaxyl® CE-27 W, 4 weeks after the finishing and jointing. This keeps the walls frost free, water and pollution repellent. In a wooded area the walls will get less quickly get green and the natural beauty will be kept after treatment. The water repellent treatment prevents that the multiple layered finish of the insulation boards are permanently burdened with moisture and there can occur internal damage or degeneration. Reaxyl® CE-27 W has a proven efficiency of more than 97% after 10 years.



### BEN Living system D

When constructing a new building there are a number of possibilities to build in an easy and economical way and still construct a building which is, without too much effort, almost energy neutral, like will be mandatory in Europe shortly. A new foundation for a new external wall and cavity wall membrane will be excessive.



## How to work:

1. Provide a concrete frost edge under the concrete slab up to – 80cm depth.
2. Glue (aerated concrete) or mason the internal cavity wall equal with the outside of the concrete slab. If you do not use aerated concrete, then you have to start with an insulation block to prevent a thermal bridge.
3. Seal all ducts and ventilations throughout the foundation or the cellar wall with Tubefix®.
4. Waterproof the ground level zone up to the (new) floor level with Reaxyl® Base-X 2K. With this you can prevent possible moisture problems because of a saturated ground level zone (read more at [www.humida.be](http://www.humida.be)).
5. The thickness of the insulation boards are to be chosen depending on the local legal determinations. Always take a minimal thickness of 12 cm PUR ( $\lambda$  0,023) or PIR ( $\lambda$  0,021). You can go 14 cm out of the building line (see building line decree). According to the VEA, a maximum deviation of 26 cm would be more appropriate.
6. Make the existing walls vapour tight with Reaxyl® Benfoil 31. To understand the need to build vapour tight and to insulate, you can best buy the manual "Isolatie 2.0". You can order these books at [www.humida.be](http://www.humida.be).
7. Install the insulation boards up to – 80cm under the to be finished ground level zone. The frost edge in Belgium and the Netherlands remains at – 80cm under the new ground level zone. Treat the underground part of the insulation boards with MasterSeal 583. Place the waterproofing with MasterSeal 583 up to 10 cm above the new ground level zone.
8. To avoid condensation on the Reaxyl® ZX pressure dividing plates under the plaster, you can first screw the vapour tight insulation board with Reaxyl® ZX-screws, plugs and pressure dividing plates about 9 pieces / m<sup>2</sup>. Against this you can glue the to plaster insulation boards with Reaxyl® ZX-290 insulation glue. Apply the glue in vertical stripes every 10 – 15 cm. So the construction is also vapour tight.
9. Glue the underground insulation boards against the foundation or cellar walls with Reaxyl® Base-Tack 2K or Reaxyl® Base-X 2K.
10. Finish the insulation boards with a suitable outside plaster system.
11. Treat all the plastered walls completely with Reaxyl® CE-27 W, 4 weeks after the finishing. This keeps the walls frost free, water and pollution repellent. In a wooded area the walls will get less quickly green and the natural beauty will be kept after treatment. Reaxyl® CE-27 W has a proven efficiency of more than 97% after 10 years.



## REAXYL® Details and finish

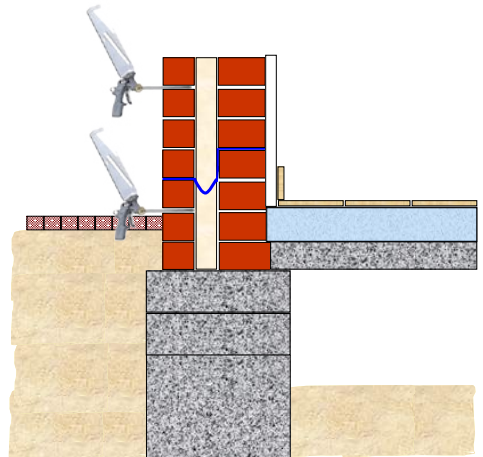
In case of a major renovation, it is best to move the windows and doors up to the insulation. The insulation can be used as reveal. A new wider windowsill can be glued on top of the insulation board with PCI® Nanolight.

If you want to insulate less far-reaching, without moving windows, you can leave the windows and place new windowsills. You can also choose to leave the existing windowsills and work with wall extensions like in the picture.

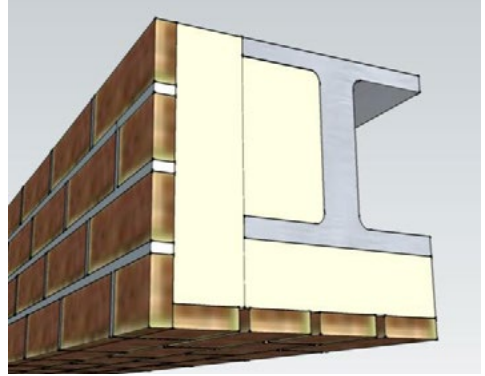
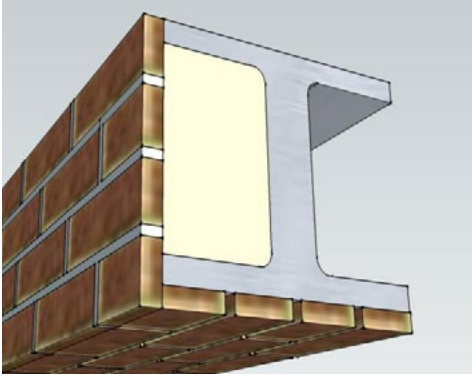


With existing buildings, without overlapping, you can move the gutter outside the new wall and place an extra roof tile. Do not forget to connect the underroof and let it come out in the gutter.

Do you have a limited aerated cavity wall and do you want to insulate and finish the building on the outside, then you are obliged to insulate all cavities with Reaxyl® ZX-Thermo. A non-ventilated cavity is the ideal place to grow mold. Make sure there is sufficient ventilation of the cellar or crawl space and insulate the ceiling of these (See our ventilation brochure).



## A H-beam can be finished simply with or without insulation.



For metal or concrete beams, which do not border a heated zone, a simple aesthetic finish with brick strips can be a simple solution.

- Cut a hard, non-compressible insulation board (PUR) at size and glue this with Reaxyl® ZX-290 insulation glue in the beam evenly with the outer edge.

- Glue brick strips or natural stones with Reaxyl® ZX-345 brick slip glue, with or without joints, on the previously treated beam.

Beams which border an inhabited or heated area have to be completely insulated with an insulation (PUR) provided with a double vapour barrier (ALU). On this you can glue all kinds of brick strips, with or without joints, with Reaxyl® ZX-345, with or without primer or any other support. Keep in mind to add 2% Reaxyl® ZX-Flex to possible joint mortar to intercept thermal settings.

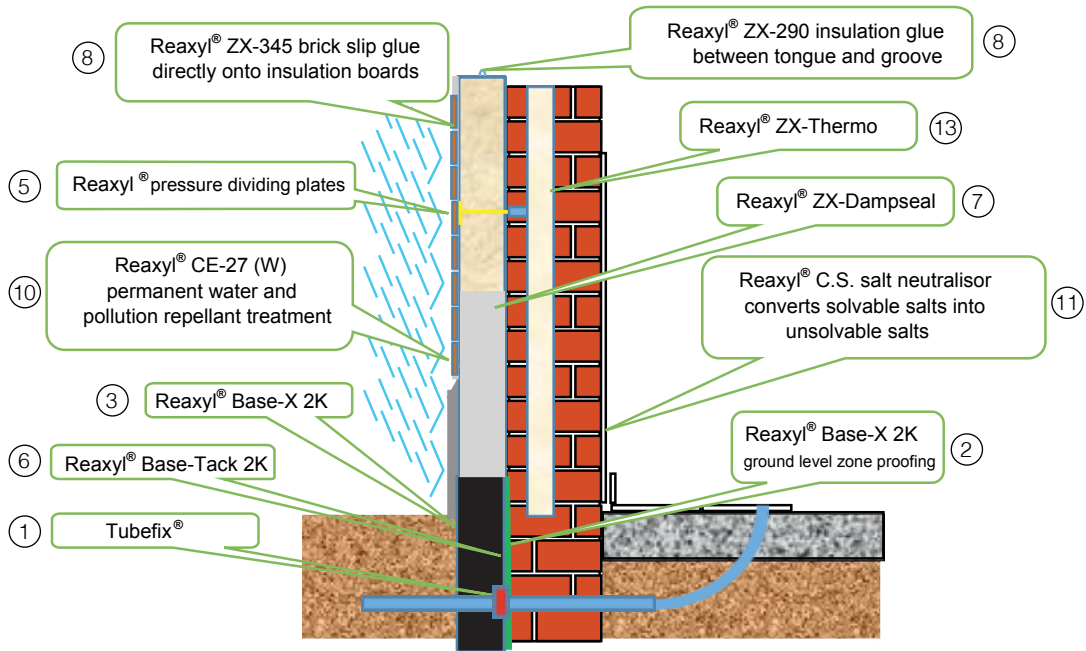


Treat all finished beams, with or without joints, completely water repellent with Reaxyl® CE-27 W, 4 weeks after finishing and jointing. The keeps the beams frost free, water and pollution repellent. In wooded areas the walls will get less quickly get green and the natural beauty will be kept after treatment. The water repellent treatment prevents that the multiple layered finish of the insulation is permanently burdened with moisture and there can occur internal damage or degeneration. Reaxyl® CE-27 or Reaxyl® CE-27 W has a proven efficiency of more than 97% after 10 years.

# An example from practice

## Calculated for a facade of 10 meters x 10 m high

1. Tubefix® = 290ml / tube  
duct sealant  
1-4 ducts / tube (depending on the diameter and the open slack).
2. Reaxyl® Base-X 2K =  $5 - 6 \text{ kg / m}^2 \times 10 \text{ Lm} \times 0,5\text{h} = 25 - 30 \text{ kg}$   
Ground level zone waterproofing  
1 x 30 kg Reaxyl® Base-X 2K
3. Reaxyl® Base-X 2K =  $0,2 - 0,3 \text{ Ltr/m}^2 \times 10 \text{ Lm} \times 0,5 \text{ h} \times 2 \text{ sides} + \text{flanks} = 12 \text{ m}^2 = 2,4 - 3,6 \text{ Ltr.}$   
Protection vapour tight insulation boards underground  
1 x 5 Ltr Reaxyl® Base-X 2K
4. Masterseal 583 =  $5 \text{ kg / m}^2 \times 10 \text{ Lm} \times 0,5 \text{ h} \times 2 \text{ sides} + \text{flanks} = 12 \text{ m}^2 = 60 \text{ kg}$   
Protection insulation boards for outside plaster  
3 x 25 kg Masterseal 583
5. Reaxyl® ZX- pressure dividing plates, screws and plugs  
= 9 pieces / m<sup>2</sup> 10 x 10 = 100 m<sup>2</sup> x 9 = 900 pieces  
Securing insulations boards above ground  
1 x 1000 pieces Reaxyl® ZX-pressure dividing plates  
1 x 1000 pieces Reaxyl® ZX-screws  
1 x 1000 pieces Reaxyl® ZX-plugs
6. Reaxyl® Base-Tack 2K =  $3,5 - 4,5 \text{ kg / m}^2 \times 10 \times 0,5 = 5 \text{ m}^2 = 18 - 23 \text{ kg}$   
Securing insulations boards underground  
1 x 30 kg Reaxyl® Base-Tack 2K
7. Reaxyl® ZX-Dampseal = 1,5 kg can / 10 – 15 m<sup>2</sup> facade insulation, 100 m<sup>2</sup> = 7 – 10 x 1,5 kg can  
Finishing vapour barrier  
7 – 10 x 1,5 kg can Reaxyl® ZX-Dampseal  
of 1 x 14 kg Reaxyl® ZX-dampseal
8. Reaxyl® ZX-345 Brick strip glue = 0,3 – 0,7 m<sup>2</sup> / tube  
Brick strip glue  
12 – 28 x 12 pieces Reaxyl® ZX-345 Brick strip glue
9. Reaxyl® ZX-Flex = 2 % on joint mortar, 688 kg joint mortar / 100 m<sup>2</sup> x 2 % = 13,80 ltr  
Additive for Elastic joint mortar  
4 x 4 ltr Reaxyl® ZX-Flex
10. Reaxyl® CE-27 W = 0,8 - 1 ltr / m<sup>2</sup>, 80 – 100 ltr / 100 m<sup>2</sup>  
Durable hydrophobic treatment  
4 x 25 ltr Reaxyl® CE-27 W  
of 4 x 10 ltr Reaxyl® CE-W Gel
11. Reaxyl® C.S. = 0,2 – 0,7 ltr / m<sup>2</sup> (= if needed for old moisture damage)  
Salt neutraliser  
1 x 5 ltr Reaxyl C.S.
12. PCI Nanolight = 1 x 15 kg = voor 2 – 8 windowsills.  
Windowsill glue (also for natural stone)  
1 x 15 kg PCI Nanolight
13. Reaxyl® ZX-Thermo = see consumption table  
Cavity wall insulation



**BEN grants:**

<http://www.energiesparen.be/ben>

<http://www.vlaanderen.be/nl/bouwen-wonen-en-energie/energie/energienormen/bijna-energie neutraal-bouwen-ben>



# Solutions for all your construction problems

webshop

[www.cruysbergghs.com](http://www.cruysbergghs.com)



**Cruysbergghs**

bvba

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